

What is claimed is:

1. An end effector for a robot, comprising:

a plate mounted to the robot, said plate having a first surface and an oppositely positioned second surface;

5 a vacuum port located on the first surface of the plate and passing through the plate to the second surface, said vacuum port being connected to a vacuum source;

10 a surround located on the second surface of the plate, said surround enveloping the vacuum port at the second surface of the plate;

a first gripping element mounted to the second surface in substantially perpendicular relationship to the plate, said first gripping element being located outboard the surround;

15 a second gripping element positioned in spaced parallel relation opposite the first gripping element whereby said second gripping element is located outboard the surround.

2. An end effector according to claim 1 wherein the second gripping element is mounted to a moving means, said means being attached to the plate whereby the second gripping element is positioned within a defined range of motion in relation to the first gripping element.

3. An end effector according to claim 2 wherein the moving means comprises a linear actuator.

4. An end effector according to claim 1 wherein:  
the first gripping element further comprises a first blade having a smooth surface, said first blade being rigidly mounted generally perpendicularly to the plate;  
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the second gripping element further comprises a second blade having a smooth surface, said second blade being movably mounted generally perpendicular to the

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plate.

5. An end effector according to claim 1 wherein the surround is positioned on the second surface in a substantially rectangular pattern and whereby the surround forms four substantially perpendicularly arranged walls.

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6. An end effector according to claim 1 wherein the surround comprises a subframe, said subframe located between the surround and the plate.

7. An end effector according to claim 1 further comprising a vacuum sensor, said vacuum sensor being mounted to said plate.

8. An end effector according to claim 1 wherein the frame further comprises a pair of parallel mounting rails positioned substantially perpendicular to the plate, each of said parallel mounting rails having a plurality of vacuum cups mounted thereon whereby said vacuum cups are adapted to selectively apply a vacuum.

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9. An end effector according to claim 1 further comprising a plurality of piercing points said points being retractably mounted to the plate.

10. The end effector of claim 9 wherein said plurality of points is retractably mounted to a mounting arm, said arm being attached to the plate.

11. An end effector according to claim 10 further comprising a plurality of suction cups located on said arm whereby said arm is mounted in substantial perpendicular relation to the plate; and wherein each said suction cups has means for drawing vacuum.

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12. An end effector according to claim 1 further comprising a plurality of suction cups, said suction cups being mounted in perpendicular relation to the plate wherein said suction cups selectively draw a vacuum.

13. An end effector for a robot for manipulating a container, said effector comprising:

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a vacuum plenum comprising a mounting plate, a surround mounted to said plate, a port passing through said plate, and a means for drawing vacuum connected to said port;

a first gripping element mounted to the plate outboard of said surround, said first gripping element comprising a stationary blade having a smooth surface, said stationary blade being rigidly mounted generally perpendicularly to the plate; and

a second gripping element comprising a movable blade having a smooth surface, said movable blade being movably mounted generally perpendicular to the plate outboard of said surround, and wherein said movable blade is positioned opposite the first gripping element.

14. An end effector according to claim 13 wherein the stationary blade includes a first smooth surface, said first smooth surface being outboard of the vacuum plenum, said stationary blade rigidly mounted generally perpendicularly to the plate;

said movable blade includes a second smooth surface, said second smooth surface being opposite the stationary blade whereby said first smooth surface faces said second smooth surface; and

said vacuum plenum is positioned between said first smooth surface and said second smooth surface.

15. An end effector according to claim 13 further comprising a plurality of suction cups located in generally perpendicular relation to the plate and wherein said suction cups are positioned to engage the container, said suction devices being connected to a vacuum means.

16. An end effector according to claim 13 further comprising a plurality of piercing points, each said point having a barbed portion, said points being retractably mounted to the plate, whereby the plurality of points are adapted to pierce a container.

17. An end effector according to claim 13 further comprising a vacuum sensor, said vacuum sensor mounted to said plate.

18. A system for gripping and transferring items from a container, said system comprising:

a supply of items within said container;

5 an industrial robot with an end effector, said end effector having a plate rotatably mounted to the robot, said plate having a first surface and an oppositely positioned second surface;

10 a vacuum port located on the first surface of the plate and passing through the plate to the second surface;

a surround located on the second surface of the plate, said surround enveloping the vacuum port at the second surface of the plate;

15 a first gripping element mounted to the second surface in substantially perpendicular relationship to the plate;

a second gripping element positioned in spaced parallel relation opposite the first gripping element; and

20 whereby items are gripped by said end effector, removed from said container and transferred to a predetermined location.

19. The system of claim 17 wherein the end effector further comprises a gripping means for gripping and transporting empty containers.